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# FOREST PEST MANAGEMENT

FPM Report No. N96-2

February 9, 1996

## Evaluation of Insect, Pathogen and Stand Conditions at the Ish Kaysh Ranch, Karuk Tribe, Happy Camp, California

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On November 6, 1995 we met with David Arwood, Karuk Tribe, and Gordon Karnes, BIA, to examine the forest vegetation on the Ish Kaysh Ranch near Happy Camp, CA (T. 16 N., R. 7 E., section 1). This property has approximately 69 acres of forested land with two additional pasture areas. The forested area has been classified into three types. One type is mixed conifer with small trees and 20-40% crown cover. This area is near and parallels the Klamath River. The second type is on a slope bisecting the two pastures. It is also a mixed conifer type with medium size trees and 20-40% cover. The third type is classified as Douglas-fir with medium size trees and the same level of cover. Major species present in the three aggregations include Douglas-fir, ponderosa pine, sugar pine, incense-cedar, and California black oak.

The parcel is relatively level and, based on the existing tree size, has been harvested in the past although stumps are not obvious. Previous mining activity is apparent in the area, as is farming.

Some pockets of ponderosa pine mortality were observed. These trees had evidence of attacks by western pine beetle, *Dendroctonus brevicornis*, and red turpentine beetle, *D. valens*. Some of the immediately surrounding pines had dead tops which could have been a result of attacks by pine engraver beetles, *Ips* spp.

Two pathogens were observed at very low levels on the site. A single declining Douglas-fir was infected by *Leptographium wageneri* var. *pseudotsugae*, the cause of black stain root disease. Other Douglas-firs with thinning crowns may also be infected by this fungus. It is common to find this fungus in the area, but generally it infects one to a few Douglas-firs with little significant impact. Occurrences tend to be associated with past site disturbances such as roads and skid trails. Sapling-size sugar pines were infected by *Cronartium ribicola*, the cause of white pine blister rust. This non-native fungus is usually fatal to trees of this size. Its presence suggests that natural regeneration of sugar pine or regeneration of non-rust resistant stock will likely not provide future mature trees. Efforts to maintain sugar pine on this site will require the planting of rust-resistant sugar pine which may be available from local Forest Service sources. In addition to these two pathogens, conks of the heartrot fungus *Phellinus pini* were visible on a few Douglas-fir trees in the area.

Overall, insects and pathogens are not currently having a dramatic effect on the forest vegetation at Ish Kaysh Ranch. However, the long-term health of these stands, as measured by vigor and growth, is declining. This decline is basically a result of the amount and type of vegetation on the site and the moisture available to it. Based on a small amount of sampling, the stands are roughly 110 years old and have a basal area of about 300 square feet per acre. The dominant trees have live crown ratio's of about 30% of the stem. These trees are still capable of responding to thinning, although this alternative will not be feasible if the trees lose much more vigor. Normal stocking on a medium quality mixed conifer site (Dunning and Reinecke site 50) at age 11 would be 287 square feet. These stands are generally overstocked.

As stands age, the amount of biomass increases to a point where an equilibrium is met and there is no significant increase. Further growth on some trees occurs at the expense of others which decline and die. Under natural conditions fire has a key role in reducing and removing some of this competing vegetation. Without it, trees become increasingly under stress and more susceptible to other agents, notably insects and, to a lesser degree, pathogens. The way these agents kill trees and the pattern of mortality may not coincide with the management objectives and future desires for the site. For example, pine bark





beetles tend to kill concentrated groups of trees rather than scattered individuals. Although they may successfully attack weakened trees initially, additional beetles that are attracted to these spots may attack and overcome immediately surrounding more vigorous individuals. This can result in mortality of pockets of 3-5 or more pines and create an opening that may not be desired. It also alters the species composition on the site.

The silvicultural measures or treatments taken for this area, if any, depend on the long-term objectives that must be established. The following alternatives and prognoses are provided to respond to a range of possible objectives.

1. No Action. Tree mortality will occur sporadically, but at an increasing rate as trees age and density increases. Mortality may not be a regular occurrence, but will tend to be concentrated during periods of below average precipitation. When mortality is at higher levels, it will occur as group kills generally of 3-15 trees in size. Otherwise, mortality will primarily be as 1-2 tree occurrences. Most of the high levels of mortality will consist of ponderosa pine, with a few scattered Douglas-firs, sugar pines, and incense-cedars. Species composition will slowly shift to the more shade tolerant species, Douglas-fir and incense-cedar.

2. Salvage. Wood volume will be recovered during periods with high mortality levels. This will not alter the pattern of mortality discussed for alternative 1. Stand growth and development will also be the same. Ponderosa pine and white fir deteriorate rapidly after the tree dies. Smaller diameter trees will lose their value as sawlogs after the first year. One difference from alternative 1 may be an increase in the amount of black stain root disease affecting Douglas-fir because of increased site disturbance.

3. Thinning. The intent of this alternative is to reduce or maintain mortality at a predetermined level that meets management objectives. Stocking will be adjusted to a level appropriate for the site. A rule of thumb would suggest a level of 70-80% of normal basal area because of the age of the stand. This would produce a residual stocking of around 200 to 230 square feet per acre. The trees designated for removal depends on the goal for the area. Average tree size and species composition can be manipulated through thinning activities. Reducing the stocking will lessen the amount of mortality caused by bark beetles, especially during drought. An increase in black stain root disease may occur, but the effect can be reduced by limiting concentrations of closely growing Douglas-fir.

4. Group Selection. This is an even-age management regime whose intent is to slowly regenerate the area without producing large openings. Small areas of up to 2-3 acres are harvested and regenerated. The number of these areas harvested at any one time, ideally, is determined by the rotation length and the amount of time between harvest entries. Thinnings can be scheduled for the areas not yet regenerated to limit the amount of mortality prior to their regeneration. Similarly, thinnings can take place in the groups once they reach a commercial size. This alternative can reduce or maintain mortality and permit selection of the desired species composition. Sugar pine can be better maintained on the site by the regeneration of rust resistant stock.



